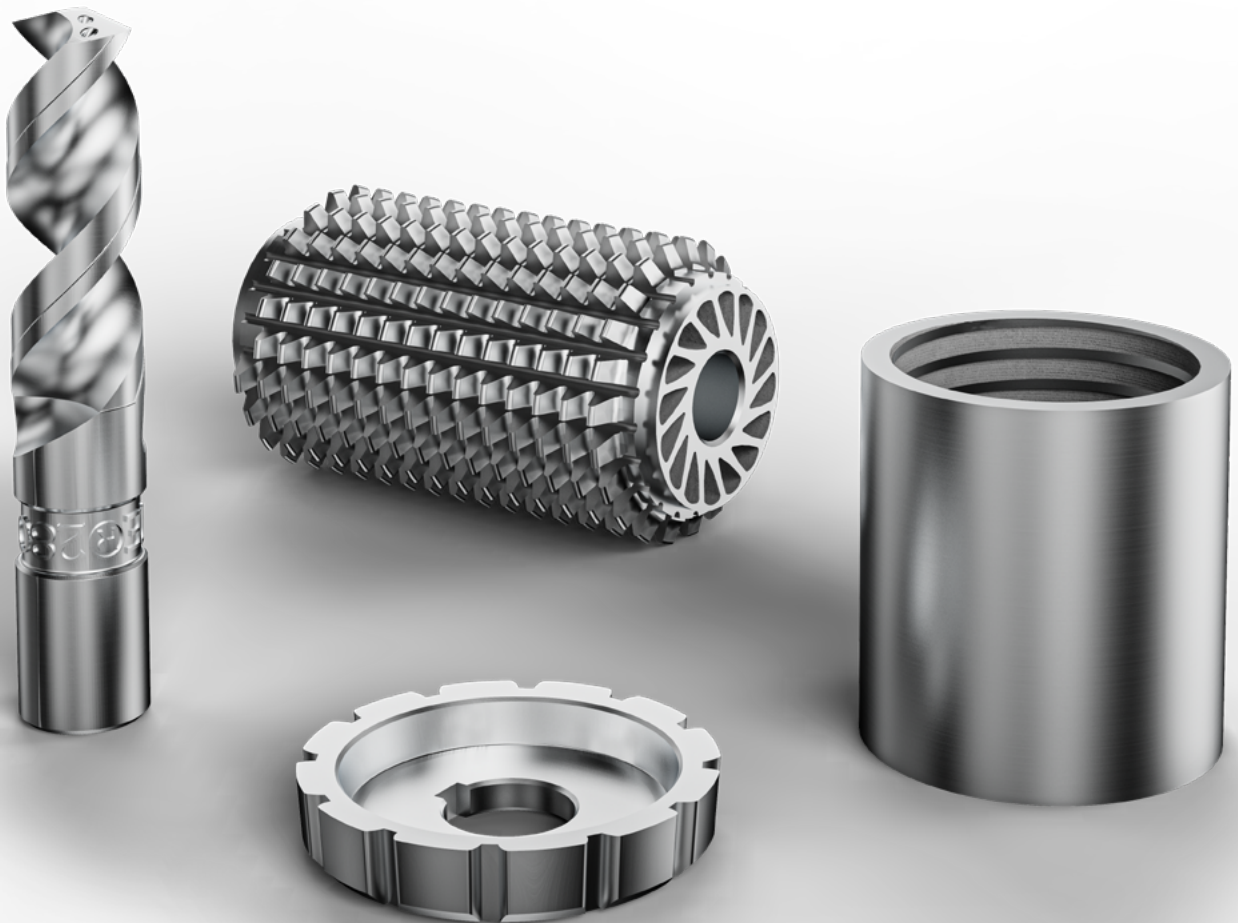


***Your application
of choice can be printed
with Vibenite® materials.***



VIBENITE® MATERIALS

VBN Components AB has combined the design freedom of Additive Manufacturing with innovative process and material developments to create a new generation of high-strength, carbide-rich tool materials branded Vibenite®. These unique, patented alloys are transforming tool and wear component performance across a range of applications, from gear cutting hobs to the mining sector.

Sweden was one of the first countries to produce industrial steel with purity as a key factor. VBN takes this to the next level by 3D printing unique materials with exceptional wear resistance and extremely high cleanliness, which significantly increases fatigue resistance.

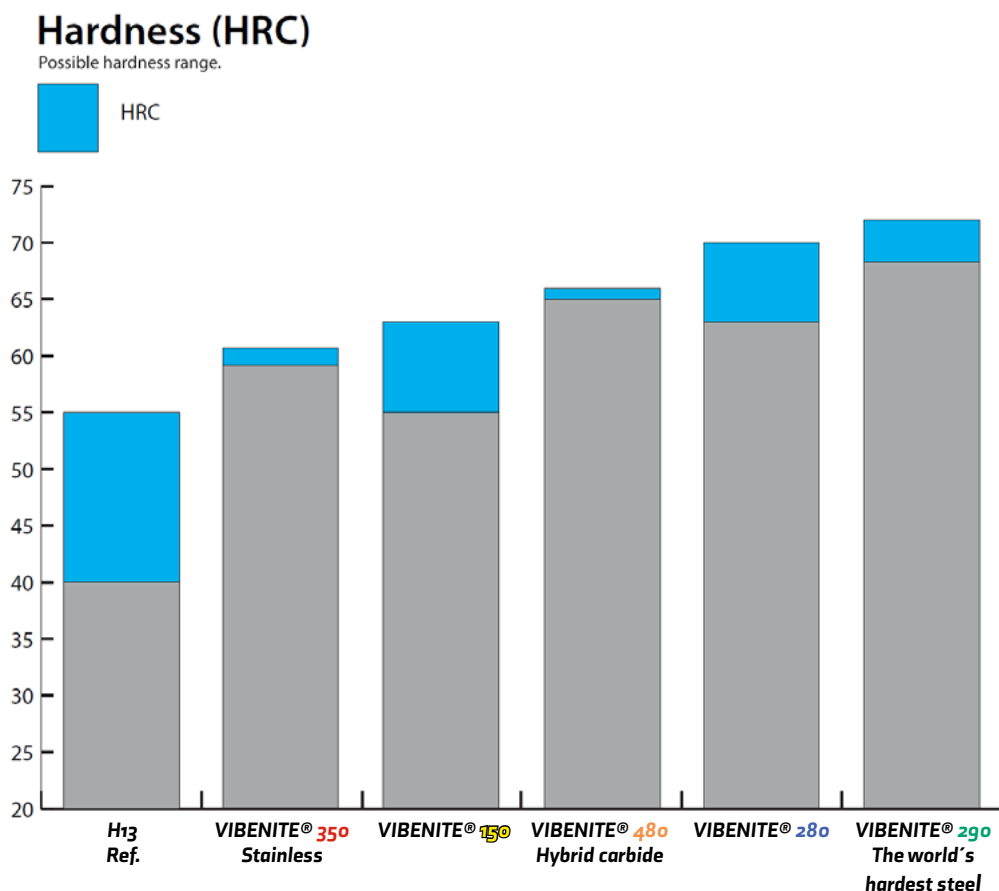
These properties are achieved through a patented additive manufacturing process, resulting in materials with 100% density. Their performance is attributable to small-sized, uniformly distributed carbides in a specific matrix. They are all produced from gas atomised metal powder and are therefore classified as powder metallurgy (PM) materials. The method is called AM-HSS™.

Vibenite® technology allows the user to switch to a more wear-resistant material than what can be produced traditionally. The customer provides a CAD drawing and receives a near-net-shape component that needs grind-

ing or Electric Discharge Machining (EDM) in order to achieve a perfect surface. A license agreement is possible for specific applications, with production at customer sites. However, it is not possible to solely purchase powder from VBN Components without further knowledge regarding the process.

When 3D printing, most production and transportation steps are eliminated, material usage optimised and environmental impact significantly reduced. In addition, both the performance and lifetime of components increase with Vibenite®.

There are currently five different types of Vibenite® materials: three high-speed steels, one martensitic stainless steel and one cemented carbide. Their hardness ranges from approximately 58–72 HRC (600–1100 HV) in order to suit different types of applications.



Hardness of Vibenite® materials compared to H13, a common tool steel.

VIBENITE® 350

Corrosion resistant multi-purpose material

This stainless PM steel is well suited to high-wear applications that need stainless properties, such as plastic processing tools (extrusions and injection tool parts, segments for segment screws), pumps and valve rings. Its high hardness of approximately 60 HRC (680–700 HV) and high chromium content provide good wear and corrosion properties and it is ideally suited to products such as pump impellers or valves, where there is a requirement for both complex shapes and high performance. These types of alloys are normally extremely difficult to machine.



Pump impeller in Vibenite® 350

VIBENITE® 150

Tough multi-purpose material

A multi-purpose wear-resistant PM steel with a high level of toughness. It has a fine-grained Fe matrix and a hardness of approximately 58–64 HRC (600–780 HV). It works well for functional prototypes, parts difficult to machine, tool holders, cold work applications that place demands on both wear resistance and toughness, plastic materials processing tools and wear parts. Like all Vibenite® materials, it can be used to increase wear resistance in your current applications.

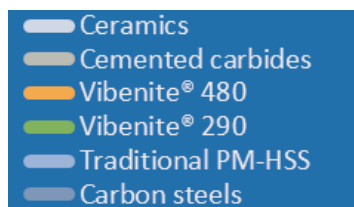
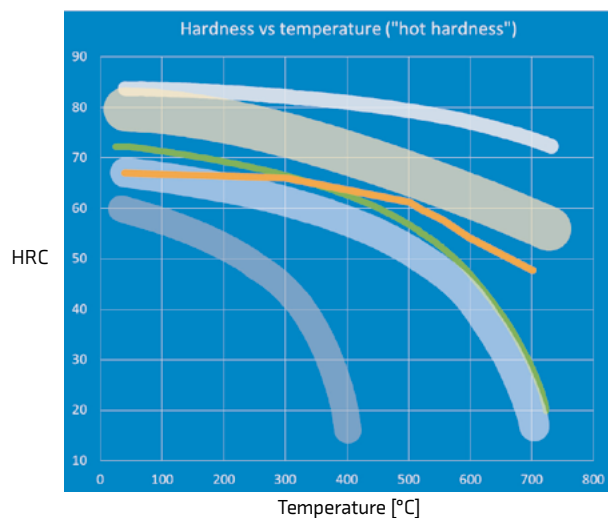
VIBENITE® 480

A new type of cemented carbide

3D printed cemented carbide (hardmetal) has previously been considered “impossible” to print due to high carbide content. However, Vibenite® 480 contains an astonishing ~65% of carbides. No mixing, drying, pressing or sintering is required, as in traditional processes. It has a long-term heat resistance of 750°C, a hardness of approximately 66 HRC (860–870 HV) and is corrosion resistant and magnetic. Vibenite® 480 is niched towards applications for which steel is normally used, but where replacing it with hardmetal would increase production efficiency, as well as towards hardmetal applications with complex geometry. Since it combines the two material worlds of PM high-speed steel and cemented carbide, it is referred to as “hybrid carbide”.

Vibenite® 480 allows the production of much larger components in a single piece than what is possible using conventional hardmetal manufacturing techniques. This adds to the number of potential usage areas and offers new opportunities for the production of prototypes.

Hardness, hot hardness and hardness after prolonged heating



The hot hardness of Vibenite® 480 (orange line) compared to other typical materials. Measurements using a Bruker TI g80 after SiC grinding to 4,000 grit.

VIBENITE® 280

Gear hob with double wear resistance

Vibenite® 280 is an extremely wear and heat-resistant PM material, especially suitable for cutting applications such as gear hobs, broaches, shaper cutters and wear parts, or as a hard, heat-resistant substrate material for PVD coatings. Its hardness is in the range of approximately 63–70 HRC (780–1000 HV). It has proven to raise production capacity for industrial tools, for instance in engine production. Extreme erosive resistance has also been noted in customer applications.

A number of gear-cutting hobs in this patented steel have been used by a large, Swedish manufacturer. In real production, the Vibenite® 280 hobs were compared to standard hobs manufactured from conventional high alloy steel, with astonishing results. The Vibenite® 280 hobs last longer, cut deeper and reduce production cost by 30–40%. (Read more in the application note for metal cutting. *)



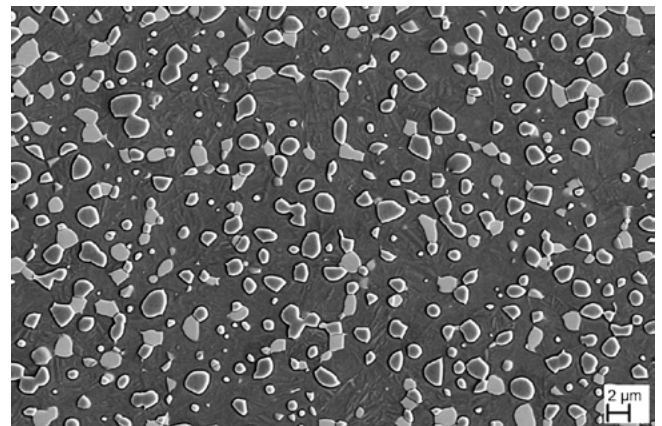
Vibenite® 280 gear hob reduces production costs by 30–40%.

VIBENITE® 290

The world's hardest steel

The world's hardest, commercially available steel, Vibenite® 290, contains 25% carbides at full hardness and is in the hardness range of approximately 68–72 HRC (940–1100 HV), meaning it could never be processed using conventional technologies. New levels of material performance are reached and previously "impossible" components are shaped. Applications include metal cutting and other high-wear applications.

When subject to two abrasion tests to measure wear against rock, Vibenite® 290 showed only 50% of the wear rate compared to the reference material H500 (51 HRC) in the first test and 25% of the wear rate in the second. (Read more in the application note for wear against rock. *)



Typical microstructure showing an extremely high amount of fine, well-dispersed carbides in a martensitic Fe-Co matrix. Total carbide content is approximately 25vol%. This sample is hardened at 1180°C and tempered at 560°C in 3x1h, resulting in Vibenite® 290 Optimum 72.

*If you wish to order application notes or individual material data sheets, please contact us!

Disclaimer

This material specification is only valid as a guideline without binding guarantees. The 3D printing process followed by hardening and possible grinding must be well controlled. If you would like further information or assistance, please get in contact with us.

Vibenite® is a patented product and a registered trademark owned by VBN Components AB.